SECTION C — (3 × 10 = 30 marks)

Answer any THREE questions.

16. The data given below will fit a formula of the type $y = a + bx + cx^2$, find the formula.

x :	87.5	84.0	77.8	63.7	46.7	36.9
y :	292	283	270	235	197	181

17. Find the positive root of $x^3 - x - 1 = 0$ correct to four decimal places by Bisection method.

18. Solve the following system of equations by using Gauss — Jacobi method (correct to three decimal places) $10x - 5y - 2z = 3$; $4x - 10y + 3z = -3$; $x + 6y + 10z = -3$.

19. Find the values of y at x = 21 and x = 28 from the following data

x :	20	23	26	29
y :	0.3420	0.3907	0.4384	0.4848

20. Using Stirling's formula, find y(1.22) from the following table

x :	1.0	1.1	1.2	1.3	1.4
y :	0.841	0.891	0.932	0.963	0.985
x :	1.5	1.6	1.7	1.8	
y :	0.997	0.999	0.993	0.974	

NOVEMBER/DECEMBER 2023

23UECS12A — NUMERICAL METHODS — I

Time : Three hours Maximum : 75 marks

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SECTION A — (10 × 2 = 20 marks)

Answer ALL questions.

1. Write the normal equations to fit $y = ax + b$.
2. State the Principles of least squares.
3. Write the formula for Method of False position.
4. Does a root of $x - \cos x = 0$ lies between 0 and 1?
5. By Gauss Elimination method, solve $y + x = 2$; $2y + 3x = 5$.
6. What is a triangular method?
7. Write the relation between E and ∇.
8. State Newton's backward interpolation formula.
9. State Bessel's formula.
10. Define an average operator μ.

SECTION B — (5 × 5 = 25 marks)

Answer ALL questions.

11. (a) Find a straight line fit of the form $y = a + bx$ by the method of group averages for the following data :

X :	0	5	10	15	20	25
Y :	12	15	17	22	24	30

Or

(b) Fit a Straight line to the data given below. Also estimate the value of y at $x = 2.5$

X :	0	1	2	3	4
Y :	1	1.8	3.3	4.5	6.3

12. (a) Solve the equation $x^3 - 2x - 5 = 0$ for the positive root by regula falsi method.

Or

(b) Using Newton-Raphson method, Find the positive root of $2x^3 - 3x - 6 = 0$ correct to four decimal places.

13. (a) Solve the system of equations by Gauss — Elimination method

$2x + 3y - z = 5$; $4x + 4y - 3z = 3$; $2x - 3y + 2z = 2$.

Or

(b) Apply Gauss - Jordan method, to find the solution of the following system of equations

$x + 2y + z = 3$; $2x + 3y + 3z = 10$; $3x - y + 2z = 13$.

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14. (a) Find $f(x)$ from the table given below. Also find $f(7)$.

x :	0	1	2	3	4	5	6
$f(x)$:	–1	3	19	53	111	199	323

Or

(b) From the following data, find y at $x = 84$

x :	40	50	60	70	80	90
y :	184	204	226	250	276	304

15. (a) From the following table, find the value of $e^{1.17}$ using Gauss's backward interpolation formula

x :	1.00	1.05	1.10	1.15
e^x :	2.7183	2.8577	3.0042	3.1582
x :	1.20	1.25	1.30	
e^x :	3.3201	3.4903	3.6693	

Or

(b) From the following table, Using Stirling's formula estimate the value of tan 16

x :	0	5	10	15	20	25	30
$\tan x$:	0	0.0875	0.1763	0.2679	0.3640	0.4663	0.5774